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Identification of Degraded Land in the Canary Islands; Tests and Reviews

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Abstract

Degraded Land is an area that either by natural causes (fires, floods, storms or volcanic eruptions) or more by direct or indirect causes of human action, has been altered or modified from its natural state. Restoration is an activity that initiates or accelerates the recovery of an ecosystem. It can be defined as the set of actions taken in order to reverse or reduce the damage caused in the territory. In the case of the Canary Islands there is a high possibility for the territory to suffer processes that degrade the environment, given that the islands are very fragile ecosystems. Added to this they are territories isolated from the continent, which complicates the process of restoring them. In this paper, the different types of common degraded areas in the Canary Islands are identified, as well as the proposed solutions for remediation, such as afforestation of agricultural land or landfill closure and restoration.

1. Introduction

The restoration of degraded areas created as one of the possible solutions to the impacts made by human activity, these activities carry the deterioration of the natural environment. Soils, forests, canyons and in general all kinds of ecosystems and the plants and animals that inhabit them, suffer daily degradation caused by all kinds of works such as roads, power lines, dams, quarries, landfills, etc.

The use of restoration means having a scientific and technical knowledge needed for proper monitoring and implementation of the actions of plant restoration or decontamination and environmental integration, aimed at solving the problems of watershed restoration mines, public works, monitoring desertification and biodiversity conservation (Gómez-Orea, 2004).

In island systems, degradation of natural areas is a major environmental problem, mainly due to the fragility of ecosystems, which in some cases, such as the Canary Islands involve breaking the balance of relict plant communities.

In addition to this impact is compounded by the fact that one of the peculiarities of the Canary Islands for tourism is the environmental values of the islands, especially the non-capital that makes much quality tourism attracted to these values.

2. Types of degraded land in the islands.

The diversity of landscapes and spaces that we provide the Canary Islands, are not always desired, from the ecological point of view, not the prettiest, from a visual point of view. Unfortunately within the insular landscape we find a number of areas that suffer degradation comprehensive treatment so your situation changes necessary. The following are the most representative.

2.1. Abandoned marginal agricultural areas

The Canary Islands are characterized by rough terrain, which means that the canary had to backport farmer to cultivate it: flatten the floor of the badlands, land transport points etc. but is the creation of terraces used to enlarge the agricultural land art. This involves making field terraces of small size which is supported by wall or slope, whose production is normally to be marketed, especially potatoes, vegetables and some fruit. Because it costs to create arable land are very high, although this soil has the great advantage of being very productive provided that you do not miss the water and the wind does not act.

On islands with more relief we can distinguish two areas, according to the slope; the north, moist and agricultural; the south, dry, barren and poor. In the latter area there are a number of changes: conversion of irrigated areas, greenhouse gases etc., which have led to an excellent yield.

The order of importance of the crop is established according to the following variables: its surface area, production and value of that production on the market. According to the different products obtained crop in the Canary Islands we can distinguish two types of agriculture:

Productive or commercial agriculture:

Located in coastal areas and the products obtained are for export. The disadvantage that occurs in this type of agriculture is that the marketed product is expensive, due to the import of fertilizers, seeds, water shortages and transportation. Typical products obtained from this agriculture are: banana and tomato.

Subsistence:

Located in areas of mediocrity and it is a traditional and family agriculture. Low profitability is due to lack of mechanization, the small size with the land is cultivated and import of such products, which are on the market at lower prices. The typical product obtained in this agriculture is the potato.

Canary agriculture right now is in a critical situation due to the following reasons:

- Moving away from the field due to the migration from rural areas to big cities, which resulted in the growth of the labor force in the service sector decreased primary
- Water scarcity and resulting high price of it: for this reason, they have to raise prices of its items, so when addressing consumer market seeking cheaper imports products from whether or worst the quality of the place (Santamarta, 2013)
- Subsidies to farmers by the Administration are quite small. Farmers have to expect that aid from one year to another

As a result of marginalization of agriculture, a progressive desertification of the field is produced due to the abandonment of the structures that were created for arable land.

The structures that have suffered this neglect are the terraces, in addition to being part of a traditional agrarian heritage that should be preserved, also pose a structure, which if cultivated, prevents the onset of erosion.

The erosion in the Canary Islands is special, because it is natural volcanic islands where erosion processes are further enhanced by the characteristics that define the arid climate of the Canary Islands. It is estimated to affect 48% of the island's surface (about 300,000 hectares), currently causing a loss of soil around about 13 tonnes per hectare per year, representing about 5 mm thick soil, according to a study Department of Soil Science and Geology, University of La Laguna. This problem is particularly acute in the islands of Lanzarote and Fuerteventura, where water erosion and wind erosion bound, causing losses of up to 150 tonnes per hectare and year.

That is why there is a need to recover these spaces devoted to agriculture to help curb erosion. One way to restore this land is reforestation, provided by the European Union through a scheme for afforestation of agricultural holdings in decline.

2.2 Deforested and / or eroded areas

The influence of aboriginals on the Canarian vegetation was quite limited, which only caused damage mainly due to the scarcity of suitable devices for cutting trees and woodworking. It should be noted, the existence of wooden items that come directly from wood such as weapons, wands, staffs, combs, pendants, torches for lighting, funeral planks, etc. The wood used for the manufacture of these objects came mostly from the Canary Island pine. With pine bark also buoys and spoons, as well as tops and bottoms of vessels were built.

With the arrival of Conquest (XV and XVI) in the archipelago much of the vegetation landscape was lost, mainly due to the high demand for wood for domestic and industrial purposes, as well as the creation of open spaces for seating cores population, farmland and grazing pastures. To this, another advantage that contributed to the felling of pines was discriminated from the distillation of the fish by burning wood, the result was a dark tar mainly used in waterproofing ships.

From the early seventeenth century to the middle of the twentieth, the maximum agricultural and livestock development in the archipelago was reached. Did not occur in this stage so many massive reclamation as in the previous period, but remained important forest use (firewood, charcoal and agricultural implements). This ended in abusive use logging, motivated by economic speculation.

The climate of the Canary Islands is characterized, especially in the eastern islands, by its low rainfall and high evaporation by limiting the availability of water and, as a result, the vegetation cover is sparse. The lack of vegetation makes the soil more exposed to the action of erosive agents such as water or wind, making significant amounts of soil from being washed out to sea or transported by wind.

They stones accumulate on the surface and protect their deeper horizons, but at the same time also

impoverish the soil. In this process the surface, rich in nutrients and microorganisms, erosion horizons have disappeared, and this forces the vegetation to adapt, not only to the scarcity of water, but also nutrient- poor soil.

Moreover, the scarcity of vegetation facilitates the infiltration of rainwater, which the water flows through the ravines and lost at sea another important resource for the livability of the area.

2.3 Spaces affected by mining activities

Canary mining has never had great development. The volcanic nature of the crag has greatly limited its mining possibilities. Yes there is some activity to provide quarry-building stone (aggregate extraction). Another activity related to mining is the construction of galleries and wells to tap underground water for consumption.

According to Census of Mining Operations de Canarias, 2007, there are a total of 94 mines in Canary: 65 in the province of Las Palmas and 29 in Santa Cruz de Tenerife.

The main sector of the mining activity in the Canaries is the aggregates used primarily for construction and public works. The second largest sector is ornamental rocks, and finally, for industrial use.

Besides the use of aggregates for the construction are also used for water treatment, waste, soil and flue gas, and electricity production and leach fields, among others.

The main environmental problems generated by the exploitation of mineral resources are:

- The landscape is one of the most affected elements. Holes and dumps that introduce artificial alien and discordant shapes are formed with the environment; sterile color contrasts in tone and intensity, with existing; panoramic views lose quality and sometimes are interrupted by varying topography
- Land use and soil characteristics are changed. Removal and occupation of fertile soil, infrastructure construction and modification of their properties compaction machinery step involves loss of soil
- Contamination of water due to increased suspended solids and waste disposal

The main operations that must be taken into account when starting the restoration of these lands where mining has been practiced are:

Dismantling and demolition of buildings and facilities

- Filling gaps
- Stabilization of operating fronts of tailings dams and waste
- Remodelled scenic terrain
- Implementation of vegetation cover

2.4 Uncontrolled landfills

One of the oldest methods for getting rid of waste has been pouring free them without any control in many different places, which are not far from the population center where they are generated (ravines, near roads, quarries abandoned etc.). This system of uncontrolled disposal of waste entails several problems: the presence of rodents and insects, fire risk, presence of odors, pollution of water and air, lack of aesthetic and environmental degradation.

Around the Canary Islands the presence of uncontrolled landfills and old abandoned objects is usual. There are records of illegal dumping of garbage in the Canaries and beyond any other environmental offenses, including illegal constructions. All this leads to the indiscriminate and constant proliferation of illegal dumping, especially in coastal areas and ravines whose degradation begins to be worrisome , especially on islands like Gran Canaria and Lanzarote.

Fig. 1. Landfill restoration in La Gomera (Tenerife)

Infringing activity on environmental issues has been significantly reduced in the Canaries due to increased inspection and control. These spaces, like landfills (Fig. 1), require a recovery order to increase the environmental quality of the place. The key actions of the restoration work are (Santamarta & Naranjo, 2013):

- Excavation and removal of waste in order to achieve a final relief as consistent as possible with the environment
- Contribution of topsoil to facilitate landscape integration
- Revegetation in which used species suit the environment
- Perimeter fence to prevent further releases

2.5Degraded land by tourism activities

The tertiary sector has experienced rapid growth over the past forty-five years in the context of the Canary Islands. Within the tertiary sector tourism highlights that in addition to employment, provides much of the income received from abroad. If at the end of the 60s islands annually received over half a million visitors in the 90s this had already passed the eight and a half million, stabilized today something more than nine million visitors year.

The quality of tourism in the Canary Islands is world-class. Addition is maintained throughout the year, thanks to a mild climate. In the Canary Islands international tourism is dominant over the national. These increasing numbers, especially retiree ends on the islands permanently installing and acquiring properties.

Tourism demand has promoted the construction of major developments that have despoiled the landscape resource of the main areas, generating rejection phenomena.

Most of the islands are often ecologically fragile and highly vulnerable to development pressures, especially from tourism. Usually have a distinctive flora and fauna that can be displaced by alien species introduced by development. The base of island resources over the last decade shows a large decrease in environmental quality due to increased sedimentation, recharge with pesticides, fertilizers and eutrophication by sewage, coastal development and discharge of industrial effluents.

The problems in areas where tourism is based are traffic congestion and demands that exceed the capacity of potable water, sewage and solid waste disposal. Wildlife can be affected by large influxes of people during critical times of migration, feeding, breeding or rearing.

It should be considered the visual and physical impact of the accommodation and other structures to be built to serve tourists.

Restoration in these areas cannot contemplate the elimination of infrastructures that were created to develop this activity, due to the financial investment involved. Therefore to restore areas where the tourist concentration is so high, as is the case of the Canary Islands, it has to start with the integration of the elements built with the environment in which they find themselves

2.6 Spaces occupied by intensive agronomic activity

The landscape image of some areas of the islands of Gran Canaria and Tenerife (mainly) has changed, becoming a "small plastic sea". The first greenhouses were established in the Canary Islands in the late 50s, especially devoted to the cultivation of flowers, ornamental plants, cucumbers and peppers. Initially, the material used to cover the film was mainly polyethylene, and glass, but then, from the mid- 80s, the translucent mesh has reached a major expansion spread.

The crops of the archipelago, under plastic, feature the horticultural crops occupied area including the tomato. In addition there are other vegetables like tomato cucumber, bell pepper, green beans and eggplant are also mainly grown in the greenhouse, with major cultivation in the island of Gran Canaria, which also account for a considerable amount of waste plastic.

Other crops grown under cover are flowers and ornamental plants. Floriculture is one of the most important agricultural activities in the archipelago, because despite the small size it occupies about 1% of the total cropped area, reaching more than 8 % of the value of total agricultural production.

The exploitation of greenhouses involves a number of environmental problems that are detailed below:

- Generation of vegetable waste: waste from agricultural production from pruning (stems, leaves, fruits), starter plants, fruits unfit for human consumption, roots, weeds, etc
- Generation of greenhouse plastic waste and pesticide containers
- Pollution from the use of fertilizers and pesticides
- Transformation of space
- Pollution of water and soil

The main treatment of these spaces is to include greenhouses in projects planning and urban planning in areas where the expansion of these structures has started.

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